

anticipated by U.S. Patent 5,891,538 to Yamamoto et al. The Examiner considered each of Ueta et al and Yamamoto et al as meeting the terms of the rejected claims.

Applicants traverse, and respectfully request the Examiner to reconsider in view of the following remarks and the Declaration evidence submitted herewith.

The present invention, as recited in claim 1 is directed to:

1. A flexible fluorine-containing material which comprises:

(a) a fluorine-containing multi-segment polymer having an elastomeric fluorine-containing polymer chain segment A and a non-elastomeric fluorine-containing polymer chain segment B in which the elastomeric fluorine-containing polymer chain segment A comprises not less than 90 % by mole of a perhaloolefin unit, and

(b) a fluorine-containing resin having a crystalline melting point or glass transition temperature of not less than 150°C, in which a weight ratio (a)/(b) is 1/99 to 99/1.

A characteristic feature of the invention is that in the fluorine-containing multi-segment polymer (a), "the elastomeric fluorine-containing polymer chain segment A contains a perhaloolefin unit in an amount of not less than 90% by mole." This feature is important in relation with the resin component (b), as described at page 19, line 8 to page 20, line 4 of the specification.

As explained therein, when block-polymerizing the elastomeric segment A with the non-elastomeric segment B to prepare the segment polymer (a), a polymer (C) which consists of the

un-copolymerized elastomer segment A unavoidably is obtained. If the polymer (C) is present in the fluorine-containing resin (b), the resulting molded articles are inferior in mechanical properties, friction resistance, etc.

This phenomenon was first discovered by the present inventors, and represents a new problem facing this field of art.

To solve this new problem, the inventors found that when "the elastomeric fluorine-containing polymer chain segment A contains a perhaloolefin unit in an amount of not less than 90 % by mole", the block-polymerization of the non-elastomeric segment proceeds smoothly to reduce the production of the polymer (C). As a result, a molded article having excellent non-tackiness and friction resistance can be prepared.

The Examiner considered in the Office Action at page 2, item 2, that "In regards to claims 1-3, Cheng teaches segment A comprising 90% by mole of a perhaloolefin unit (vinylidene fluoride)". This understanding is incorrect, because vinylidene fluoride (VdF) is $\text{CH}_2=\text{CH}_2$, and is not a perhaloolefin.

The Examiner further considered in the Office Action at page 2, item 2, that "In regards to claims 7-8 and 13, Cheng teaches segment A comprising 15-75% of perfluoro(alkyl vinyl ether) and 0-85% of tetrafluoroethylene ... (see claims 1-2)". Claim 2 of Cheng describes, as the elastomeric segment, "(b) perfluoro(alkyl vinyl ether), tetrafluoroethylene and vinylidene fluoride repeat units in a mole ratio of 15-75:0-85:0-85".

The other two cited references Ueta et al (US Patent 4,487,882) and Yamamoto et al (US Patent 891,538) also disclose the same elastomeric segment.

The Examiner concluded, on the basis of such description, that "the elastomeric fluorine-containing polymer chain segment A contains a perhaloolefin unit in an amount of not less than 90 % by mole" is disclosed in the cited references.

However, the description in the cited references teaches that the elastomeric segment contains at least perfluoro(alkyl vinyl ether) (PAVE) in an amount of 15-75% by mole and the remaining may be tetrafluoroethylene (TFE) and/or VdF. Namely the description in the cited references does not teach that the elastomeric fluorine-containing polymer chain segment A necessarily contains a perhaloolefin unit in an amount of not less than 90% by mole, and further, in other descriptions of the cited references, every explanation as to the elastomeric segment pertains to an elastomeric segment containing VdF unit in an amount of 40-90% by mole, i.e., containing a perhaloolefin unit in an amount of not more than 60% by mole.

Namely, each of the cited references fails to disclose and/or exemplify an elastomeric fluorine-containing polymer chain segment A containing not less than 90% by mole of a perhaloolefin unit as claimed. For this reason alone, it is respectfully submitted that the present invention is not anticipated by any of Ueta et al and Yamamoto et al, and withdrawal of the foregoing rejections under 35 U.S.C. § 102(b) is respectfully requested.

Applicants further demonstrate the unobviousness of the present invention over the cited prior art by reference to the comparative experimentation presented in the executed Declaration Under 37 C.F.R. § 1.132 of Nobuhiro Horano submitted herewith, as follows.

In Examples 1-6 of Cheng et al, the thermoplastic elastomer (fluorine-containing multi-segment polymer) used therein is "Dai-el T-530 available from Daikin Industries" (column 7,

lines 13-15 of Cheng et al). This thermoplastic elastomer is the product of the assignee of this application (DAIKIN INDUSTRIES, INC.) and is sold as a trade name "DAI-EL® Thermoplastic T-530", and contains VdF unit in an amount of 40-90% by mole.

In order to compare DAI-EL® T-530 with the fluorine-containing multi-segment polymer (a) according to the present invention, an experiment was conducted. The details are shown in the Declaration attached hereto. Example 3 ((a)/(b)=20/80) of Applicants' specification was selected for comparison as being closest to EXAMPLE 1 of Cheng et al where the thermoplastic polymer (ETFE) and the thermoplastic elastomer (TPE) are blended at a ratio of 77/20.

As is shown in Table A of Declaration, as a result of comparing the present invention (Example 3) with Comparative Example A, when using the fluorine-containing multi-segment polymer (a) of the present invention in which the polymer chain segment A comprises not less than 90% by mole of a perhaloolefin unit, the mechanical properties are improved and the surface property (contact angle) is increased, and further non-tackiness is improved.

With respect to Ueta et al, Ueta et al relates to a blend of a fluorine-containing rubber and fluorine-containing thermoplastic rubber (elastomer), but does not disclose the blend of the fluorine-containing resin (b).

For this additional, the present claims are patentable over Ueta et al.

In view of the above noted differences in structure, particularly with respect to composition of the elastomeric polymer chain segment A, and the resulting advantageous effects of the invention, namely, enhanced mechanical properties, surface property and non-tackiness, it

RESPONSE UNDER 37 C.F.R. § 1.111
U.S. Application No.: 10/018,345

is respectfully submitted that the present invention is neither anticipated nor obvious over the cited prior art, and withdrawal of the foregoing rejection is respectfully requested.

Withdrawal of all rejections and allowance of claims 1-14 is earnestly solicited.

In the event that the Examiner believes that it may be helpful to advance the prosecution of this application, the Examiner is invited to contact the undersigned at the local Washington, D.C. telephone number indicated below.

Respectfully submitted,



Abraham J. Rosner
Registration No. 33,276

SUGHRUE MION, PLLC
Telephone: (202) 293-7060
Facsimile: (202) 293-7860

WASHINGTON OFFICE

23373

CUSTOMER NUMBER

Date: August 18, 2003